3953 Deer

JOB COMPLETION REPORT

INVESTIGATIONS PROJECT

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State of New Hampshire

Project No. FW-2-R-3 Title of Job Studies of Deer Licks.

Objective: To determine what attracts deer to the Garfield Falls deer lick in northern New Hampshire (referred to erroneously in some previous reports as the Atkinson-Gilmanton Academy Grant deer lick).

Techniques Used:

Two main techniques were used to study the Garfield Falls Deer Lick in the spring of 1955:

1. Observations of deer visiting the lick were made from a blind as soon as possible after deer began visiting the lick following the disappearance of snow.

2. One-time Clover deer markers (Clover, 1954) were set up during the period of observations.

These techniques were used instead of those originally planned because it was realized that previous laboratory analyses of materials from this lick (McCullough, 1953) had not been backed by sufficient field observations. Because of the appearance of the lick and the deer sign observed in 1953, analyses of soil from the lick and surrounding area were emphasized. Observations made this spring were intended to ascertain whether the deer were using soil, water or vegetation from the lick.

In the previous study (McCullough, 1953) three deer, all of which were identified as does were observed at the lick. It was speculated that perhaps only pregnant does used the lick and that the material obtained by the deer fulfilled some physiological need(s) arising from pregnancy. The detection of small quantities of Vitamin B-12 in the lick water led to the suggestion that this vitamin was the attractant for deer. More extensive observations were made this spring to ascertain the identity as to the sex and age of deer using the lick.

A plywood all-weather and insect-proof blind was constructed and transported to the lick on May 9-10, 1955. The blind was erected May 10-11 and observations were made during the next two weeks (May 17-27) at all hours of the day and night except late morning.

Clover one-time deer markers were constructed and set up along trails surrounding the lick during the period May 17-27. Fourteen markers were put in place by May 18. The markers were set for more than 67 "marker-nights". Nineteen shots were fired from the markers. In five cases sign indicated that deer had been marked and two different marked deer were subsequently seen. In eight cases it was questionable whether deer were marked or not and in six cases markers were probably tripped by shrinkage of trip strings caused by changes in atmospheric moisture or the guns misfired when tripped by the deer.

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Techniques Used: (continued)

Markers were checked daily when observing parties were in the area and were left set between observing periods. When markers were found fired after intervals of more than one day it was not possible to tell how many nights they were set before they fired. They were assigned a value of one marker-night, although they may have been set for longer. Markers which were not fired during such periods were each given the full number of marker-nights for the interval since they were last checked. Hence the figure of 67 total marker-nights is low.

During the periods May 10-12 and May 24-27 the observations were made by two observers alternating in the blind, each one observing from about 5:00 p.m. to dark and from daylight to 8:00 or 9:00 a.m. The on-duty observer slept in the blind while his alternate remained at the base camp two-and-one-half miles away. During the period May 16-20 three observers alternated shifts around the clock except for the late morning hours when the marker guns were checked. Two observers remained in the blind at night, splitting the observation time between them. This type of observing was done in order to guide future observations to conform with peak activity periods by the deer. Night observations were based primarily on audible clues although one deer was spotted at the lick with a flashlight without its being distrubed. Peak activity appeared to be confined to the twilight hours or morning and evening although deer were heard in or near the lick during many of the hours of darkness. Few deer were seen at the lick during the afternoon.

Findings:

A. Behavior of deer at the lick.

In order to ascertain why deer came to the Garfield Falls Deer Lick it was first necessary to observe

(1) when, how often and for how long they came to the lick, and

(2) what they did at the lick.

Such observations serve to indicate the importance of the lick to deer in the area and whether the substance(s) they seek at the lick is in water, soil or both. For these reasons observations of the frequency and duration of visits have been made. Whenever social interactions were observed they were noted in order to determine what social attractions might bring deer to the lick and whether there was social intolerance as occurs at winter feeding stations and salt licks (Kabat, et al. 1953; Buss and Harbert, 1950).

1. Frequency of deer-visits to the lick. A total of 67.2 hours of observations were made during May. They were made during all hours of the day and night except between 9:30 a.m. and 1:45 p.m. Observation periods were spread over nine dates from May 11-26.

Fifty deer-visits to the lick were observed during daylight hours. The frequency of visits was 1.0 deer-visits per hour. Most of these deer were seen from daylight until 7:30 a.m. and from 5:00 p.m. to darkness. Only one deer visited the lick during five hours of afternoon observing. During 18 hours of darkness deer were heard in the vicinity of the lick on five occasions. From these observations it can be tentatively concluded that deer utilize the lick most frequently

Findings: (continued)

during the early morning and evening hours. These two periods may correspond with peaks in routine daily activities. Such peaks of activity are known to occur among yarded deer (Kabat, op.cit.; Buss, op.cit.). In addition to observing the frequency of use by the resident deer population as a whole, a few observations of the frequency of use by individuals were made. One recognizable adult buck came to the lick twice during a single evening with a three-hour interval between visits and again early the following morning. Another buck visited the lick twice during the same morning with a one hour interval between visits. Another adult buck visited the lick twice in one evening with an hour interval between visits and again early the following morning. He stayed at the lick for 8-10 minutes at each visit.

2. Duration of deer-visits to the lick. Another measure of the importance of the lick to the deer is the amount of time they spent at the lick. Forty observations in which the duration of the visit was known are shown in Table 1. The breakdown is according to deer in which sex and age identity were quite certain to the observer and deer which were not certainly identified. There are too few observations for detection of significant differences between sex and age groups.

The average duration of 40 deer-visits for which times of arrival and departure were noted was 11 minutes. Bucks tended to stay longer than does and yearlings stayed longer than adults. Kabat et al. (1953) noted that lone fawns in a yard .. "were strikingly lacking in alertness" and frequently ."..would disregard the alarm behavior of older deer and continue feeding after the other deer had gone, and when they joined a group of deer in fleeing the food area, the lone fawns as a rule were the last to leave the food area and the first to return." This type of behavior may also occur at a lick although our observations of fawns are very limited at present.

3. Social and antagonistic behavior. Deer are known to be highly social animals with gregarious tendencies. Social antagonism has also been observed within aggregations of deer (Kabat, op.cit.; Buss, op.cit.). It is these social tendencies which would serve to establish traditions and habits in deer. Use of licks by deer may well be established and maintained by tradition and habit, possibly even after the initial attracting feature has long since disappeared. At the Hell Gate camp in Atkinson-Gilmanton Academy Grant, salt is set out each summer. The salt set out in the summer of 1954 was gone by May of 1955 yet sign indicated that deer were digging at the previous location of the salt during May. While there may have been residual salt in the soil the water from melting snow and heavy precipitation would certainly have leached away much if not all of so soluble a substance as salt. Unfortunately no soil analysis for salt at this lick has been made and the salt block has since been replaced.

Social aggregation of the deer at the Garfield Falls lick was observed during May, 1955. Ten groups of deer varying in size from two to five individuals were seen at the lick. The most obvious social attachment was between yearlings and does, presumed to be family groups. In three cases yearlings came to the lick with does and in one instance a yearling attempted to suckle from a doe. This type of grouping is a commonly observed one in deer. It may serve as a means whereby traditional use

Findings: (continued)

of a lick is maintained, fawns learning from parent does of the location of palatable substances in water or soil. Future observations may indicate when fawns start following does to this lick and at what age they begin to use the lick in the way that adults do.

Groupings of adult deer of both sexes were also observed. A combination of two bucks, unidentified as to individuals, was seen on four occasions. On one occasion the smaller member of the pair was observed licking the muzzle of the larger animal but on other occasions the larger buck was antagonistic toward the smaller deer. Two adult does were seen together, once at the lick when no other deer were present and once accompanied by three yearlings.

Antagonistic behavior between deer was observed on five occasions. In all cases a large buck dominated either fawns or adult does. Antagonism was shown by head on approach followed by kicking, or rearing and kicking, with the forefeet if the subordinant deer did not retreat. On one morning an adult doe approached the edge of the lick area three times, retreating each time at the approach of an adult buck already at the lick. Finally, when the buck had departed, an adult doe, presumably the same animal, gained access to the lick.

Such dominance relationships have been observed in both penned and wild deer by other investigators, sometimes associated, by the writers, with competition for food. Whether crowding as such or competition for resources is the real stimulus for such behavior is a moot question. If the latter was true at this lick it would tend to emphasize the attractiveness of the lick materials for the deer.

4. Responses of deer to the lick. Through these observations it has been possible to determine

1. that deer come to the lick to drink;
2. that the water consumed is taken from two restricted spots, designated sites A and B, and
3. that what appeared to be soil lapping spots are probably the result of wear from the feet of deer stepping over obstacles.

All four observers present during May of 1955 agreed that the deer were drinking, not consuming soil. Although the muzzles of deer in the act of drinking were hidden in all cases by uneven ground, swallowing action, dripping muzzles and water at the drinking sites made it plain that the deer were drinking. Such observations were made repeatedly and by all four observers independently. In no case was a deer seen to lick bare soil in the lick area.

The drinking all took place at two sites, A. and B. These two sites are located on depressions at the water's edge. At both sites the soil along the north edge of the sites rises in a low, vegetation-crowned hummock. The bottom is bare mud surrounding the sites on the other three sides but bare spots of gravel about one foot across appear where most of the drinking was done. Directly above site A there is a hummock about a yard in diameter supporting moss, sedge

Findings: (continued)

and a small spruce. A very small flow of water comes from under the hummock and flows across site A. This is either a spring or part of the general flow through the lick area. At B there was no flow observable. The soil was slightly worn above Site B.

Deer appeared to be most strongly attracted to Site A: Of 92 drinks taken by deer 71 (77%) were at site A. On several occasions deer drinking at A moved to B when driven away from A. In addition some deer drinking at Site B did so while another deer was at Site A and then moved to A as soon as the other deer moved away. There was, however, free movement back and forth between the two sites by some deer.

It thus appears that the attractant substance which the deer seek is in water located in two restricted spots, one of which (A) appears to be preferable to the other (B) either because it has water more palatable to the deer or, being more open, is preferred as a drinking site. In any case the attractant was not sought elsewhere.

The so-called "main lapping spot" observed by McCullough in 1953 is still present. It lies between Sites A and B. A photograph of the spot and a description were given by McCullough. During May, 1955 deer were observed to step over this spot repeatedly, sometimes dragging their feet or ventral hair and dripping water on it from their hooves while passing back and forth between Sites A and B. No deer licked the "main lapping spot" or showed any interest in it as such. It may, however, be lapped or licked during drier weather when water is scarce in the lick although if it contains attractive substances for deer one would think they would show some interest in it even with water present.

5. Summary of behavior at the lick. The following observations of deer at the Garfield Falls lick were made during May, 1955:

1. The frequency of visits by deer to the lick was about 1.0 visit per hour. Most deer came to the lick in the late evening and early morning. Some recognizable individuals visited the lick at least two or three times during a 24 hour period.

2. Deer stayed at the lick an average of 11 minutes at each visit.

3. Social groupings, which may be the basis for continued yearly use of the lick, were observed. Groups varied from two to five in number. Doe-yearling groups were most obvious.

   Antagonistic behavior between deer at the lick was common. Larger deer appeared dominant over smaller deer. Such antagonism influenced the accessability of the lick to subordinate deer.

4. Deer drank water at the lick but did not consume soil.

5. The water consumed was from two restricted spots within the lick area.

Findings: (continued)

6. Worn spots of soil formerly thought of as soil lapping spots now appear to be the result of wear by deer traffic.

B. Population composition of deer at the lick.

The observations of behavior of deer at the lick related above have already indicated that deer of both sexes and various ages visited the lick during May, 1955. Population estimates of deer at the lick serve certain useful purposes:

1. The number of deer visiting the lick reflects the importance of the lick to deer and/or the size of the population unit using the lick.

2. The sex and age composition of deer using the lick reflects differentials in needs of the sex and age classes for the lick materials and/or the sex and age composition of the population unit in the lick area.

Prerequisite to estimating the population of deer using the lick is the marking of individuals. An intensive effort was made to mark a number of deer with paints and dyes. This effort was not successful due to difficulties encountered in the use of Clover's one-time deer markers (Clover, 1954) and due to the rapid progress of moulting by the deer at this time. Only two deer were known to have been marked and these were seen but once. Description of molt progress was not useful for individual identification from week to week. As indicated earlier, however, certain individuals were identifiable over shorter spans of time. These observations, plus the sex and age grouping of deer seen can be used to determine a minimum number of deer using the lick.

Table 2 shows the sex and age of the deer in a total of 50 deer-visits observed at the lick. Since repeat visits by individuals are not considered in the figures, the numbers represent a combination of lick-visit frequency by deer as well as size of the population during the observation hours. In spite of difficulties encountered in identifying sex, age and individuality of the deer, one can conclude from Table 2 that bucks, does, adults and young of the previous year all use the lick in May. Therefore, if the deer use the lick to make up a simple or complex nutritional deficiency this deficiency does not arise from pregnancy alone, if at all. The limitations of these observations make further speculation on the physiological origins of palatability of lick water to deer seem unwarranted at this time.

A minimum estimate of the number of deer using the lick can be made from the largest number present at one time, and sex, age and individual identity of the deer seen. Five does (2 adults and 3 yearlings) were seen together at the lick. At least three bucks were seen, two of them together. Probably two other individual does were seen. Thus eleven separate individuals can be accounted for. Allowing for the frequency with which clearly identified individuals came to the lick it is doubted that more than double this number

Findings: (continued)

were using the lick regularly during the observation period.

In summary, these observations make it clear that the lick was used by deer of both sexes and of varying ages during May. At least eleven deer used the lick during the observation period. The estimate of the maximum number using the lick is subjective.

Analysis and Recommendations:

A. Analyses:

Studies of the Garfield Falls lick during May, 1955 have shown that deer come to the lick to drink in two localized spots. This observation suggests that attempts to learn by laboratory analysis what the deer are seeking should emphasize examination of water. For this purpose water samples have been collected from the localized drinking sites and from other water sources in and near the lick area. At the present time there are no other analyses of water from this lick on record except Varney's (1953) analysis for vitamin B_{12}.

Previous laboratory analyses of the lick soils (McCullough op.cit.) did not reveal any substance(s) present or concentrated at the lick but absent elsewhere. The distribution of soil samples in the earlier study was not oriented in relation to the localized areas which the deer used during the current study. The soil may be the source of the substance(s) obtained by the deer from the localized drinking spots but if so these substances should be equally localized in the soil.

McCullough (op.cit.) pointed out that the main lapping spot might be the result of wear by the hooves of deer. The bare soil of this raised spot is worn smooth. In other licks in New Hampshire which I have looked at deer apparently took soil. These places were considerably roughened and scuffed by deer loosening dry or damp soil with their hooves but they were not smoothed by lapping. A roadside lick near the Pontook Reservoir had a smoothed, bare spot in a low ridge of soil which lay across a trail entering the lick. Such a spot also exists in a trail not far from the Garfield Falls lick. Direct observations of the deer in this lick now reveals that such spots are the result of traffic over them by deer going back and forth along trails and, in this case, between the two drinking sites. There are no areas in the Garfield Falls lick where deer appear to have been digging soil. This movement pattern appears to have been in existence for many years.

McCullough pointed out that there was some evidence that deer licks in other eastern states were used mainly by does. In buck law states this would naturally appear from the frequency of does in the population. New Hampshire has always shot both sexes. At the Garfield Falls lick the frequency of visits was nearly equally distributed between the sexes. If there were actually more does than bucks visiting the lick then these data would mean that frequency of visits by individual bucks must be considerably greater than the frequency of visits by individual does. In any case the attraction of the lick to both sexes appeared equally strong. This observation, if valid, does away with sexual differentiation of the attractiveness of the lick materials and makes speculation

Analysis and Recommendations: (continued)

about it less certain. The only outward evidence of physiological changes common to both sexes in May is growth of hair and bone. If this reflects a need for calcium then both sexes should continue to use the lick through the summer to support lactation and antler growth. McCullough, however, found very little calcium in the soils of the lick.

The social behavior of deer at the lick appeared typical of deer behavior reported in the literature. Familial attachments of fawns of the previous year to does were still present. This type of aggregation undoubtedly serves to maintain continued use of the lick over the years. This lick is thought to have been in use for at least fifty years and perhaps longer.

Other sources of attraction for deer may include odors, especially those created by excretions which deer were observed to leave in the lick within a few feet of the drinking sites, or odors of the specific attractant contained in the lick water. Two of four observers smelled and tasted lick water from drinking site A. Both agreed that there was a very slight sulfurous odor and taste. Copper strips, which would be blacked by sulphur, were dipped in water at Sites A, B, a third site in the lick, a puddle a few yards from the lick, and in the river. At Site A there was a very slight blackening after air drying which was not observed elsewhere. All the strips showed minute, finely crystaline, white deposits around the edges of dried water drops. Thus a strong concentration of sulphur did not appear to be present.

Some measure of the importance of the lick to deer was obtained from observations of the frequency and duration of visits by the deer and the social antagonism which occurred. The latter may be indicative of competition between deer for the lick waters. Such encounters were centered around drinking Site A which was the most frequently used of the two sites.

B. Recommendations:

1. Continuation of this study.

The study has been written into Project FW-2-R for three consecutive years. Due to lack of personnel, it has been active only during 1952-53 and at the end of 1954-55. At this time a satisfactory conclusion to the study cannot be made. Leads as to the nature of the attractant substance(s) at the lick were obtained during 1952-53 and this spring information has been obtained to show how and when the deer use the lick. A combination of these two results should aid considerably in attaining the objective of the study.

The study should be continued for the following reasons:
(1) to increase the volume of field data;
(2) to determine the seasonal use of the lick;
(3) to observe seasonal changes in the lick and
(4) to permit more voluminous collection and analysis of lick materials, especially water.

Analysis and Recommendations: (cont.)

B. Recommendations:

2. Other Licks:

The intensive study of this lick may be of little value to ecological thought without an extensive study of deer licks in the state and their importance on deer ranges. Some of these licks have already been located but the information is too limited to reach conclusions on their relative importance in New Hampshire deer ranges. While there may not be time for much effort to be spent on extensive study under the present project, it should be kept in mind both now and in the future.

Summary:

Direct observations of deer at the Garfield Falls Lick were made during May, 1955. These observations revealed:

1. that both sexes of deer came to the lick fairly frequently to drink water at localized spots.

2. that soil was not consumed but that frequent passage over raised ground may smooth the soil so that it appears to have been licked, and

3. that social groupings existed which may play a role in maintaining a tradition of lick use.

The relative importance of the lick to deer was indicated by the frequency and duration of visits to the lick and by aggressive interactions between deer at the lick.

Data and Reports:

A. Tables (attached hereto).

B. Literature cited:

1. Buss, I. O. and F. H. Harbert.
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2. Clover, M. R.
1954. Deer Marking Devices. Cal. Fish and Game 40(2):175-181.

3. Kabat, C., N. E. Collias and R. C. Guettinger.
1953. Some winter habits of white-tailed deer and the development of census methods of the Flag Yard of Northern Wisconsin. Tech. Wildl. Bull. No. 7, Wisc. Cons. Dept.

B. Literature Cited: (cont.)

4. McCullough, R. A.
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TABLE I.

Mean Duration of Visits by Deer to the Garfield Falls Deer Lick in May, 1955

	Adults	Yearlings	Age Unknown	Average
Males	13 mins. (11)*	22 mins. (2)	10 mins. (2)	14 mins. (15)
Females	8 " (9)	9 " (5)	17 " (2)	9 " (16)
Sex Unknown	8 " (3)		12 " (6)	10 " (9)
Average	10 " (23)	13 " (7)	12 " (10)	11 " (40)

* Number of observations in parentheses.

TABLE II

Sex and Age Frequency of Deer Visits to the Garfield Falls Deer Lick in May, 1955

	Adults	Yearlings	Age Unknown	Totals
Males	13	2	4	19
Females	11	6	6	23
Sex Unknown	2	1	5	8
Totals	26	9	15	50

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